

THE SCOPE


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THE SCOPE



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Editorial

In order to keep the wheels of progress moving there must be co-operation among the many other factors vital to human needs.

Just what does co-operation mean? The association of a number of persons for their common benefit; collective action in the pursuit of common well-being, especially in some industrial or business process. The term co-operation is often inaccurately applied to profit sharing.

Co-operations means voluntary democratic common action for common ends. It is unforced self-help through the medium of service. It is self-directed activity on the part of a group of men, for the achievement of ends deemed mutually advantageous.

The peculiar merit of the co-operative agency as contrasted with the commercial lies in its non-exploitive character, and its mutuality.

We should co-operate because it increases efficiency; it promotes good feeling; it improves quality; it creates enthusiasm, and it gets results.

The very essence of accomplishment is co-operation. Let us get into the spirit of co-operation and really co-operate. Co-operate with your classmates, teachers, officers of your society and your school. Then, and then only will come about the spirit of harmony and good-will that sweeps all opposition before it, and becomes the

bedrock from which springs progress and happiness.

What a world of happy individuals this would be if people who were given the "breaks" would occasionally stop to help a less fortunate associate.

How many people reach for much, but seldom lend a helping hand to those about them? Too few are they who help the other fellow up the ladder after they have gotten to the top. The main achievement seems to be, to put something over on someone.

How often we hear the phrase: "I'm not interested in anyone but myself." These shallow creatures are poor counterparts for the men of character whose names will live through the ages. If they would scan the library shelves for records of men whose

course they will never follow, it may prove novel if nothing else to them.

Selfishness toward our fellow creatures is no criterion for character building. It's a weakling's way of showing his true colors. His life would be richer and finer, if he would but consider the other fellow's right, co-operate with him to the fullest measure.

No truer words were uttered than the following: "The people who pass us by on their way up the ladder, are the same people we will expect to meet going down." Food for thought, and a bit of wisdom for the lad who is always asking favors, but seldom find time to do one kind deed for the co-operation extended in helping him to the seat of honor he holds.

Eye, Eye, Suh!

M. OSSEN

In the March issue of the Good House-keeping Magazine, there is an interesting article by Ruth Murrin entitled, "Eye, Eye, Sir! (the SCOPE must be widely read?)... Her first statement, though, is questionable—"Eight out of ten times, when a man meets a woman, he looks *first* at her *eyes*"... It takes ten weeks for an eyelash to replace one that has fallen out... Alhazen, an Arabian philosopher, wrote the first book on Optics and in this book was the first presentation of the "law of refraction"... Almost 90,000 of the drafted men for the U. S. Army during the world war were rejected because of defective eyesight... Safety slogan seen in a local factory: "We once employed a man who couldn't see the need for wearing goggles—now he can't see the goggles"... The Penn. Railroad requires its enginemen, firemen and motormen to have 20/20 in each eye without a correction; but its street crossing watchmen may have 20/30 in one eye and 20/40 in the other

with or without a correction... Toscanini, the eminent conductor, is so severely handicapped by myopia that he has to learn his scores (musical) by memory... The U. S. Military Academy will not admit anyone having hyperopia, hyperopic astigmatism, or compound hyperopic astigmatism with naked vision less than 20/20... Broadcasting station WCOP, at irregular intervals, presents transcribed programs dealing mainly with the importance and the care of eyesight—the theme song is, "Your Eyes Tell Me So"... H. G. Wells is a hyperope (and I'm a democrat)... Visual experience constitutes about 48% of our learning... Hamberger, a professor of Mathematics in the University of Jena, wrote, in 1695, the first book, established on a scientific basis, dealing with the hygiene of the eye... Dr. George Wald, of Harvard, says that the healthy retina is immensely rich in Vitamin A and when it lacks this vitamin, dim vision occurs.

Cross Cylinders in Modern Refraction and Diagnosis in Muscular Imbalances

DR. PHILIP QUINN.

For years cross cylinders have been in use as instruments of refraction. During the past several years they have assumed considerable prominence due to the work of Peckham, Skeffington, Jacques, McCulloch and several others who have conclusively shown that they are one of the "sine qua non" of Modern Optometry.

This monograph makes no claim to originality but is merely a rational attempt to set forth the various ideas and uses to which various investigators have put the cross cylinders. Inasmuch as the sum total of knowledge regarding cross cylinders has been compiled by no one man, there has arisen a diversity of opinion at interpretation.

It is the aim of the writer to set forth the various techniques and apply the interpretation tacked on them by the various proponents. This precludes the possibility of misunderstanding during a discussion.

There are two principle uses of Cross Cylinders: 1st Their use in refraction. 2nd Their use in diagnosing imbalances between the intrinsic and extrinsic ocular muscles. This, incidentally, is the order of the evolution of Cross Cylinders and will be so treated in this article.

The following is a skeleton outline of the use of them:

Refractive Uses—

1. To determine the amount of astigmatism.
2. To locate the axis of the correcting Cylinder.
3. To determine the presbyopic reading Addition.

Diagnostic Uses— (As used by R. M. Peckham)

1. Finding the Latent Hyperopia.
2. Indication of Sectional Astigmatism.
3. Convergence-Accommodative Rela-

tions, at Distance and Near.

4. Used to Measure Relative Convergence.

Diagnostic Uses— (As used by Skeffington)

1. To determine the most fatigued Function—Acc. or Conv.
2. To determine the amount of reading addition required either in Presbyopes or in Non-Presbyopes when the necessity arises.

Diagnostic Uses— (As used by Jacques)

1. To determine how much Accommodation is induced by converging to the 16" near point (Fused X-Cyl).
2. To determine the *inter-relationship* between Convergence and Accommodative Lags.

Refractive Uses to determine the amount of Astigmatism: First determine axis of the correcting Cylinder by the ophthalmometer, Static and Dynamic Skiametry, the "Swinging Axis" or any pet test that you use for the Axis. Have the patient "fogged" to about 20/30 or 20/40. The Cross Cylinder (a plus .50 Cyl. combined with a minus .50 Cyl.) is held first with its PLUS axis coinciding with the predetermined axis direction and it is suddenly "flipped" around until the MINUS axis of the Cross Cylinder is coinciding with the predetermined axis. The patient is then asked which way looked the best,—the 1st or 2nd position. This is better illustrated by taking a specific example. Suppose with the Ophthalmometer, skiametry, "swinging axis" etc. the MINUS axis of the Cylinder was determined to be at 180. Hold the Cross Cylinder MINUS axis first at 180, then at 90 and ask the patient which of the two ways looked the best. If, with the Cross Cylinder MINUS axis at 180, patient claims vision was best, insert in Phoropter or trial frame a minus .25 Cyl. X 180. The "flipping" process is

again repeated, holding first the Minus then the Plus axis of the Cross Cylinder coincident with the minus .25 Cyl. X 180 that is in the Phoropter or Trial Frame. If again vision is improved with Cross Cyl. MINUS axis at 180, add another minus .25 of Cylindrical power at 180. The "flipping" process is again repeated. This process is repeated until the patient is no longer able to tell which of the two positions of the X-Cyl. is the best. When both positions look alike to the patient, we have fully corrected the Cylindrical part of his Rx. To sum up: when vision is improved by coincidence of the MINUS axis of the X-Cyl. and the minus axis of the Cyl. in the Phoropter, *increase* the correcting cyl. by a quarter of a diopter. If vision is improved when the PLUS axis of the X-Cyl. is coincident with the MINUS axis of the Cyl. in the Phoropter, *decrease* the correcting cyl. by a quarter diopter. Keep repeating this until vision is equalized with either position of the X-Cyl.

Caution: Be careful not to over-correct "against the rule" astigmatism, particularly in advanced age.

To locate the axis of the correcting Cylinder: The theory behind this is as follows: If 2 cylinders of like power and sign are superimposed one upon the other with their axes at an acute angle, there is produced a new cylinder of different strength whose axis is midway between the two aforementioned axes. Suppose, for example, the suspected cylinder before the eye is a minus 1.00 X 90. Yet we want to be sure that the axis is 90. We then take a X-Cyl. (a Minus 1.00 Cyl. combined with a Plus 1.00 Cyl.) hold it so that its MINUS axis is at 45 degrees and its PLUS axis is at 135 degrees. There is then produced a new minus cylindric effect with its axis at 67.5 degrees. If we now "flip" the X-Cyl. so that its MINUS axis is at 135 degrees, there is then produced a new cylindric effect whose axis is midway between 90 and 135, or 112.5 degrees. If the axis of the patient's cylinder should be nearer 45 than 135, both positions of the X-Cyl. may cause a blur

but the blur will be less pronounced when the MINUS axis of the X-Cyl. is at 45 degrees than when it is at 135 degrees. If the patient should say one position is better than the other, the axis of the correcting cylinder should be shifted a few degrees toward the preferred position of the Minus axis of the X-Cyl. The test is then repeated. When we finally manipulate the Correcting cylinder into a position such that the both positions of the X-Cyl. look alike, we've finally located the correct axis.

To determine the Presbyopic reading Addition: Use a plus .50 Cyl. against a minus .50 Cyl. One X-Cyl. over each eye with its plus axis at 180. Use a X-Cyl. near card composed of a set of horizontal and vertical parallel lines. Test first one eye alone while the other is occluded, then reverse the procedure and test the other eye. Then do both eyes together. Direct patient's attention to the "cross" lines on the card. Ask him which lines appear the clearest or stand out the most prominent, the horizontal or the vertical. If the horizontal lines stand out the clearest, add plus power. If the vertical lines stand out the clearest, deduct plus or add minus. Of course, obviously, in Presbyopic cases, the horizontal lines will most always be the clearest, and accordingly, we keep adding plus until the horizontal and vertical lines are uniform. We then have the correct Presbyopic "add" for the distance at which the test was done. The test card is held at the distance at which the patient's near work is to be done. Unless otherwise specified, the test card is usually held at 16 inches. This is the best distance for all around near work. Occasionally, we will find that the correction that equalizes the horizontal and vertical lines is not strong enough for clear vision. In this instance, Peckham and McCulloch claim, "Then we justly suspect digestive and intestinal disorders; usually there is a history of constipation. In this class we frequently find that the lines appear a brown, blue or red in color instead of appearing black or gray. These colors indicate toxemias." These colors must be differentiated from the

colored lines met while doing the Latent Hyperopia X-Cyl. Test. In the Presbyopic toxic cases, the lines when colored, appear to be a *solid* color. Whereas, in the Latent Hyperopic X-Cyl. tests, if the color does appear, it takes the form of *colored fringes* along the edges of the lines. (Peckham)

Diagnostic Uses as employed by Peckham:

Before discussing the technique and interpretation of these tests, I want to clear up a few things about them. These tests as will be described under this particular heading should be done using a Kratometer—NOT Risley Rotary Prisms. They were originally worked out by Dr. R. M. Peckham. He used a certain technique to disclose Latent Hyperopia with X-Cyls. and base in prisms on the Kratometer. Many refractionists learned the technique and tried to use it employing Risley Rotary Prisms. Then when it didn't work, they started to discredit the use of the X-Cyl. and base in prisms for disclosing Latent Hyperopia. Dr. Peckham never intended this test for use with X-Cyl. and Risley Prisms and has stated this fact many times. Nevertheless certain men insist on using them thus. Risley prisms, consisting as they do of 2 prisms which, while superimposed one upon the other, turn in opposite directions producing a resultant prismatic effect, and having a slight air space between the adjacent faces, produce more dispersion than do square prisms. Further, when looking through say 10 degrees base out O. U. on Rotary Prisms, we are looking through a much greater thickness of glass than when looking 10 degrees base out of square prisms. A friend of Dr. Risley told Peckham that "The old gentleman used to rave" at the misuse to which manufacturers were putting his invention. The Risley Rotary prisms were originally intended only for measuring phorias; not for ductions and exercises. Let us go on with the technique.

Finding the Latent Hyperopia: Use Kratometer with near X-Cyl. target. Turn right rotary disc to 3 degrees base up and the left rotary disc to 3 degrees base down. Now, the lower image belongs to the O. D.

and the upper image belongs to the O. S. Distance Rx should be in place. Use a X-Cyl. which produces a slight blur over each eye. Usually a plus 50 Cyl. combined with a minus .50 Cyl. is sufficient. Insert these X-Cyls., one over each eye with its plus axis horizontal. This produces an artificial interval of Sturm with its horizontal focal line in front of the retina, and its vertical focal line in back of the retina. Obviously, if accommodation increases, the vertical focal line comes nearer to the retina with the result that the vertical lines on the X-Cyl. target come out the clearest. If accommodation decreases, the horizontal focal line comes nearer to the retina than the vertical and hence the horizontal lines on the X-Cyl. target come out clearer. (1) Add or subtract plus to equalize the lines on both the upper and lower target. (2) Correct any existing exophoria by base in prism from the horizontal slides until vertical alignment of the two targets is obtained. (3) If, in correcting this Exo., the horizontal lines of the targets come out blacker, again add plus to equalize both targets. If this new amount of plus moves the lower target to the left (increases exo.), add more base in prism to again align the targets vertically. This process is continued until no more plus can be added without making the vertical lines clearer than the horizontal, nor can more prism be added without shifting the upper cross-cylinder target to the left. This is supposed to disclose the full amount of Latent Hyp. When a considerable amount of plus (over and above the distant subjective) is found by this test, Latent Hyp. is shown to be the cause of the stress. When either vertical or horizontal lines persist in standing out the blackest, sectional Astigmatism is indicated and Orthoptics should be instituted to get the necessary relaxation so that the proper cylinder may be accepted with comfort.

Convergence-Accommodative relations at distance: Insert a X-Cyl. of sufficient power to cause a slight blur at distance over each eye. For a target use a distant X-Cyl.

Chart or else have the patient confine his attention to the vertical and horizontal limbs *only* of the distant astigmatic dial. Plus axes of the X-Cyls. should be horizontal. Ask patient which lines come out the clearest, the horizontal or vertical. If the vertical come out the clearest, add minus to equalize the lines; if the horizontal come out the clearest, add plus to equalize the lines. When the health is good and involuntary muscle tone normal, it takes about a minus .25 sphere to equalize the appearance of the lines. Much more than this occurs in stomach hyperacidity. This minus is not prescribed, however. This test is done first on either eye alone then on both eyes. If, after equalizing the eyes monocularly by this method, the binocular test shows the vertical lines clearer and more minus has to be added, it shows that the patient is one of those types who relax convergence-accommodation when one eye is occluded. This shows that the monocular correction as found over-corrects the eyes binocularly and will not be accepted comfortably. Either we must reduce the plus, or give sufficient base in prism to equalize the lines.

Convergence-Accommodative relations at near: Insert a X-Cyl. over each eye sufficient to cause a slight blur of the near X-Cyl. target and equalize the lines for first O. D., O. S., then O. U. just as at distance. Of course, in the great majority of cases in this test at near, it requires plus lenses to equalize the lines. This test, somewhat like dynamic skiametry though not exactly, due to the different working conditions, gives us the accommodative lag behind convergence. The following table gives the amounts that are required over and above the distant subjective to equalize the lines at different ages when no gross binocular imbalance is present. It was compiled by Dr. R. M. Peckham. This table was compiled at 35 Cms. Distance.

Age 4 to 6 yrs.	Add Plus 2.00 to 2.50	Diopters
Age 6 to 8 yrs.	Add Plus 1.50 to 2.00	Diopters
Age 8 to 10 yrs.	Add Plus 1.25 to 1.50	Diopters
Age 10 to 14 yrs.	Add Plus 1.00	Diopters

Naturally we cannot assume this table to be perfectly exact; yet any *wide* variation from it has a certain diagnostic significance. If much less than this is found, there is usually hypertonicity of the ciliary muscle. If very much more than this is found, hypotonicity obtains. Of course these findings by themselves are of little use. It is their relations to other findings that make them valuable.

Measuring Relative Convergence: As every student of optometry knows, Relative Convergence is that amount of convergence which can be exerted or relaxed while accommodation is held fixed. Positive Relative Convergence being measured by that amount of base out prism that the patient can overcome without blurring the image; Negative Relative Convergence being that amount of base in prism that can be overcome without blurring the image. (These are the orthodox definitions usually given and have no relation to Dr. Jacques' technique which will be explained subsequently). Peckham claims that noting this so called "first blur" is not sufficiently accurate as a myope used to blur would report the "first blur" later than would a Hyperope with small pupils who is used to maximum visual acuity. Hence accommodation is affected without the operators' knowledge. If the image goes blurred with base out prisms, minus lenses usually clear it. If the image blurs with base in prisms, plus lenses usually clear it. There are some persons who speak of a blur which is not cleared with these plus and minus lenses. Hence, he claims that the "first blur" is without much significance. He, accordingly, uses X-Cyls. binocularly with their plus axes horizontal and of such strength as to cause a slight blur. The test is binocular. The lines of the target are first equalized. Then prism base out from the horizontal slides of the Kratometer are added gradually and the patient reports the moment the vertical

Age 14 to 18 yrs.	Add Plus	.75	Diopters
Age 18 to 25 yrs.	Add Plus	.50	Diopters
Age 25 to 35 yrs.	Add Plus	.25	Diopters
Age 35 to 40 yrs.	Add Plus	.00	Diopters

lines come out the clearest. This will be a measure of the Positive Relative convergence. The prism slides are again set at zero with the slides at base in. Base in prism is now added slowly until the horizontal lines come out the clearest. The minute this happens, we have reached the limit of Negative relative convergence. In cases of arrested development of the convergence accommodation function and convergence insufficiency type cases, this positive relative convergence is always low. Regarding the exact amount of Positive Relative Convergence, they claimed that as yet they had come to no final conclusion as to the exact amount. However, since that time, Jacques claims it is 13 to 15 Prism Diopters base out that should be over-come. But Jacques does his test for relative convergence not with binocular cross-cyls., but by having the patient read the finest print possible while Prism base out, then Prism base in are put in front of the eyes and patient told to inform the operator when the print "blurs out"; not the first blur, but when the finest print just barely becomes obliterated. Reverting again to the X-Cyl. method, the amount of Negative relative convergence should equal the amount of Prism Diopters of convergence used. For example: Patient looks at target 16 inches away and has a P.D. of 60 mm. He then uses 15 Prism Diopters of Convergence. Then,—that is the expected for the negative relative convergence i. e. 15 Prism Diopters. It must be understood that all of the foregoing pertaining to Relative Convergence has been discussed with reference to the near point. The same tests can be conducted at distance using a distance X-Cyl. card. However, there seems to be a paucity of exact data concerning the expecteds at distance with X-Cyl. The Graduate Clinic Foundation places the expected for the distance Positive relative convergence at from 7 to 9 prism diopters; however, it must be re-

membered that this expected was not arrived at by using binocular X-Cyls., but by having the patient focus on the finest print possible on the distant test chart. Skeffington claims the base out prisms should be slowly increased and the patient tell us the moment the "first slight blur" occurs. Jacques on the other hand, instead of having the patient note the "first blur", is supposed to inform the operator when the print "blurs out" which finding we should naturally expect to be slightly higher than the "first blur". All we can gather from this is that there is still more work to be done regarding these distance relative convergence tests. However, you as students, have a right to "know all the angles" on it so that confusion may be avoided.

Diagnostic uses as interpreted by Skeffington: The theory behind this is, to quote from the Graduate Clinic Foundation; "All ocular discomfort originates from the reflex excess stimulation of the less fatigued function by the more fatigued function, and the consequent violation of the habitual brain pattern of innervation." (That's a mouthful!) Read it over carefully, and commit it to memory. It is one of the cardinal points of modern Optometry. It means just this: An unfatigued muscle does its normal amount of work by receiving a normal amount of nerve energy. When this muscle becomes tired from overwork, the toxins of fatigue accumulate in the muscle. The conductivity of the nerve supplying this muscle is reduced. Consequently, an excess amount of energy has to be discharged to this muscle to do the same work it did *before* it became fatigued. The above quotation refers, of course, to the Accommodation and Convergence. If, for example Accommodation becomes fatigued, extra nervous energy has to be discharged to the ciliary muscle to accomplish the act of focussing, that is, more so than before fatigue set in. Consequently convergence being linked up with Accom-

modation by the medium of the 3rd nerve and past habit, will receive more energy than it needs to accomplish fixation. Conversely, if convergence fatigues more rapidly than Accommodation, it is necessary for the brain to over-innervate the convergence to accomplish fixation; this accordingly carries with it an over-stimulation to the accommodation. Now,—so much for the theory. The binocular unfused X-Cyl. test is for the purpose of ascertaining which of the two functions is the more fatigued one—Accommodation or Convergence. Technique is as follows: For this test operators in the Graduate Clinic Foundation use either a Phoropter, or Refractor which of course carries dissociation prisms, Risley prisms and a battery of spherical and cylindrical lenses. Distance subjective should be in place. Next insert a pair of X-Cyls., one over each eye. A plus .50 combined with a minus .50 is the power usually used. Target is a near Cross-Cyl. chart upon which there is a square cross, the arms of which are composed of parallel lines. (Before inserting the X-Cyls. be sure that the lines of the cross are uniform to begin with.) Next throw in a vertical dissociating prism. This of course produces a vertical diplopia. Next, if the images are not in vertical alignment, make them so with the Risley prisms, power horizontal. Now the two crosses are one right underneath the other, and there is a X-Cyl. over each eye with its plus axis horizontal. Usually the horizontal lines of the targets look clearer than the vertical and naturally, plus lenses are required to equalize the lines of the target. When you have equalized both the upper and lower target, remove the two cross-cyls. Then with a reduced Snellen Chart target take a horizontal phoria making the patient read the very finest print possible. Now,—you have a certain amount of plus “add” over and above the distance Rx, and usually you will have a certain amount of exophoria. The amount of exo. is compared with the “add” thus obtained to find which of the two functions are the more fatigued, Acc. or Conv. This test is done at 16 inches. Now we

know that with a P. D. of say 60 mm looking at 16 inches there is exerted 2.50 D. of Accommodation and 15 P. D. of Convergence. The total amount of accommodation that can be inhibited at this distance is 2.50. The total amount of convergence that can be inhibited at this distance is 15 P. D. If it took a plus 2.50 to equalize the lines (over and above the distant Rx) and it took 15 P. D. base in to align the Reduced Snellen Charts, there would be shown a total inhibition of both Accommodation and Convergence. However, this rarely occurs. Suppose it took plus 1.25 sph. O. U. over the distant Rx to equalize both targets; then we would expect that it would take about 7½ P. D. of base in prisms to align the targets. In both of these instances there would be “equal inhibitions in ratio”. Suppose now that we take a couple of abnormal cases.

Distance Subj: Negative O. U.

Unfused X-Cyl: Plus 1.00 O. U.

Induced Phoria: 14 Exo.

In this instance the plus one is a *smaller* part of the total 2.50 that can be inhibited than is the 14 exo. which is a *greater* part of the total 15 P. D. of Convergence. Therefore we say convergence is inhibited *more* under this test than is Accommodation, and therefore Convergence is the more fatigued function. Let us take another case.

Distance Subj: Plus 1.00 O. U.

Unfused X-Cyl: Plus 3.25 O. U.

Induced Phoria: 6 Exo.

In this case the plus 2.25 “add” is a greater part of the total 2.50 of Accommodation. The 6 Exo. is, comparatively speaking, a relatively smaller part of the total 15 P. D. in use for this distance. So we say Accommodation is inhibited more than is convergence, and hence Accommodation is the more fatigued function. And that is just what the test tells us, i. e. whether it is Accommodation or Convergence that is the more fatigued function. Of course when Accommodation is the fatigued function, plus is in order. When Convergence is the fatigued function, we must be chary of plus lenses. A good rule to determine which is the most fatigued function is as follows: Take the

"add" as found by the X-Cyl., multiply it by the Interpupillary distance in Cms., and compare the product thus found with the amount of induced phoria. Following is an example:

Interpupillary Dist. minus 60 mm.

Distance Subj: Plus .75 Sph O. U.

Unfused X-Cyl.: Plus 2.75 Sph O. U.

(Add plus 2.00)

Induced Phoria: 5 Exo.

6 Cms x 2.00 equals 12

This 12 is higher than the 5 Exo. Therefore the Accommodation finding is higher and hence the more fatigued function.

Of course, this finding and technique are not to be interpreted as all embracing. It is their relation to other findings in the examination that tell us the true story.

Skeffington uses the X-Cyls. another way. When after a complete analytic examination, it has been shown that additional plus is necessary for near we then make use of the binocular fused X-Cyl. test. Technique: Distance Rx is in front of eyes. A pair of X-Cyls. are placed in front of eyes with their plus axes horizontal. A plus .50 Cyl. combined with a minus .50 Cyl. usually suffices. This test is binocular. Direct patient's attention to the cross lines on the target. If horizontal lines stand out clearer, add plus sphere O. U. in sufficient amount to equalize the appearance of the lines. After the lines have been equalized, change the target to one having a Reduced Snellen chart and dissociate the eyes vertically. Exophoria will usually be found. Insert sufficient base in prism from the Rotary Prisms to align the two targets, being sure that the patient is reading the very finest print possible. In the cases requiring bifocals, whether pre-presbyopes or presbyopes there will be found a considerable quantity of plus over and above the distant Rx. Of course the full plus is not prescribed until the deduction is made for the accommodative lag. If the induced phoria under this finding is 6 Exo., a .75 lag is deducted; and for each successive 2 degrees of Exo., deduct a scant .37. Further than this, this "add" to be given must bring the "blur-out

points" to somewhere around their expected. This finding, as well as all the others, under this particular Foundation Technique must be compared with other findings in the examination.

Diagnostic Uses (Jacques): Jacques' technique in the use of X-Cyls. is virtually the same in result as that employed by Skeffington except that the method of approach is slightly different. To get the general slant on Jacques' technique and interpretation it will be necessary to start with the near phoria. A normal pair of eyes looking at 16 inches exert 2.50 D. of Accommodation and 15 P. D. of Convergence. Putting it another way, by virtue of the third nerve innervating both Accommodation and Convergence, when 2.50 Accommodation is exerted, it also induces (theoretically) 15 P. D. Convergence. Conversely when 15 P. D. of Convergence is exerted, it induces 2.50 D. of Accommodation. Practically this is not so. We dissociate the eyes vertically. Use a Reduced Snellen Target. Patient reads very finest print possible. Now, if patient is reading the finest print possible at 16 inches, we know that 2.50 D. of Accommodation are in force. Usually exophoria is shown under this test. The amount found in the normal case according to Jacques is 5 degrees. Now, if there is 5 P. D. of exo., that means that the full amount of convergence (15 P. D.) is not being exerted. To put it another way 2.50 D. Accommodation instead of inducing 15 degrees of Convergence induces only about 10 degrees. This is the element of "play between functions" that acts as a shock absorber to fatigue. Next the Fused X-Cyl. test is done. We know when we put the X-Cyl. target at 16 inches from the eyes that 15 P. D. Convergence is in force. We then usually find in a normal case that it takes about plus .50 to plus .75 to equalize the lines of the target. In other words, when we force 15 P. D. Convergence, this in turn, instead of inducing a corresponding 2.50 D. of Accommodation, induces only about a 1.75 to 2.00 D. This represents the play in the Accommodative function. To sum up, there

is, in the normal well balanced case, a slight lag of Accommodation, and a slight lag of Convergence which afford a nice easy play between functions and absorbs any slight fatigue. If there is a large difference in these ratios, there is unequal fatigues and then lenses or orthoptics are in order, provided this tendency is shown in other tests throughout the examination. Next is the Un-Fused X-Cyl. which allows both Convergence and Accommodation to dangle simultaneously and then we compare them both at the same time to see definitely which of the two functions is the most fatigued. This technique is the same as the Unfused X-Cyl. in the Skeffington Technique.

In the use of X-Cylinders there are many things that must be guarded against. We must first be sure that, subjectively, we have done as accurate a refraction as possible. Some times the spheres will be equal subjectively and not so under the Unfused X-Cyl. test. Again, subjectively, the spheres may be unequal and with the Unfused X-Cyl. they may be equal. Again there may be chromatism of the lines, caused by too much illumination on the targets or toxemias as suggested by Peckham and his associates. Sometimes it is difficult to get the patient to accept the proper cylinders, subjectively, and here we'll have difficulty with the X-Cylinders. We must be on the lookout for all of these things to avoid falling into error. There have been instances when the X-Cyls. didn't work, the vertical lines remaining black under the fused X-Cyl. Test. At least minus lenses should have equalized them, but did not. Theoretically base in prisms should have equalized them, but did not. Peckham had a couple of these cases and upon close investigation these patients showed a hyperphoria which when corrected, he was able to equalize the appearance of the lines on the target. Of course, such cases as these are not of frequent occurrence, but we can, at least be on our guard against them.

Another fact we must bear in mind when doing X-Cyl. tests, is that Accommodation is a two way function. In other words "inhibition" is just as active an act as "stimulation". Also the Accommodative inner-

vation is closely tied up with the sympathetic nervous system. We know that dysfunctions in one part of the sympathetic nervous system affect organs in another remote part of that same nervous system. In other words Accommodation can be affected by the imbalances in visceral organs which no doubt can account for the occasional apparent paradoxical findings with X-Cyls. and Skiametric tests.

In conclusion, I might add that in certain instances I've gone into rather minute detail to explain some of these techniques and interpretations. My sole reason has been a sincere desire to aid the student and clear up some of the fog that seems to enshroud this subject. It is obviously impossible to go into detail on every branch of this subject. For further reference, the student is referred to the bibliography listed below.

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Junior News

The trip to Perkins was very interesting as Smith missed Watertown and landed out in Wellesley.

Hughes started to hike home one day last week and wound up with a "Ratinal" appearance. (All wet!!)

We understand that on a certain Tuesday night, H. S. performed an operatic selection! (He probably thought he was Delilah from the opera "Perkinju Sampson and Delilah.")

A certain Junior is that way about a pernicious blonde! (So much so that he has even gone so far as to offer her cherry-drop candy!!!)

Here's G. C.'s novel method of taking an exam;

(1) Hold paper as close to eyes as possible, causing a larger retinal image and, as a result, less work for the (brain?)

(2) Have mouth open as wide as possible in order to consume all the thoughts of those surrounding geniuses and also to cleanse, purify and filter his knowledge (if any? with clean, fresh air!!) (For a brilliant discussion—question him regarding

his "Theory"!)

Shack reviewed "Practical Optics" to such an extent that he went back to the days of Pompeii in order to ascertain their "inclination".

The Boston Police Department held their annual "surprise" last week and as a result was Rakusin's countenance flourished!! (The parking ticket was no Ishi Harry shade of red, either!!)

Dave Berlowitz was set on the idea of disrupting Dr. Green's theory of Duration so he called on the able assistance of Barney Levin, a ferry (g)rand person, who not only gave assistance but also formed a theory of his own; If on taking the green field, the patient is green blind and calls the color red, why not take a red field?? (Bolshevik Optometry—read all over.)

By the way, the Convention was a huge success; everyone checked their hats and coats and sat in the comfortable lounge chairs!! The enthusiasm was terrific also—especially so on the part of the B. & L. salesman and the M. S. O. Professors!!



In answer to your fond parents who want to know what you have learned in three years at college, I submit this review of our three year course—

Freshman Year:—Minus lenses are poison.

Junior Year:—Nancy is the most popular, with Mary a close second, but Patricia does not seem to fit.

Senior Year:—Base in prisms divert the flow of neuricity to the abductors.

It must be spring now if—

Robinson gets another haircut, that's three this year, isn't it Robbie?

Anapolle the ultra-conservative, doffs the conventional dark gray, for his Miami Beach "toutfit".

Dr. Paul Cline goes operatic with a sizzling soprano. "Bad cold", he gasps, but

I think its from eating too much "C" food.

The Fenway "Bawling" Alleys, are completely renovating Dr. Klein's trained runway. They're going to put hurdles in it to bring his score down to ours.

Collier sets the example with a perfect record for promptness at the 9 o'clock class. After much difficulty I succeeded in getting an interview and he modestly states, "Ever since I heard Rudy Vallee sing on my phonograph, I wanted to break a record."

As thousands cheer, Fishelson sacrifices his standing at school, and nobly donates his time and services to the Boston Dispensary, where he eases the suffering, and mends the hurts of the poor unfortunates. Bravo, Max, you are made of the stuff that builds new worlds.—(concrete—don't let it go to your head).

Perimetry

PAUL S. CLINE, O. D.

No one will deny the tremendous influence of the X-Ray in dentistry and in the field of general medicine. Whenever there is a suspicion of a fracture or a pathologic entity, be it tumor or ulcer, the X-Ray is the first method, in general, resorted to, in the corroborating or disproving the tentative diagnosis.

Perimetry is aptly considered by many as being one of the most powerful methods employed in diagnosis of both pathology and anomalous conditions of the eye and its cerebro-neural connections. It is needless to list the multifarious conditions which have been uncovered by the perimetric investigation. Neurosurgeons find perimetry a valuable aid in localizing and determining the possible extent of a brain tumor.

The science, or as some would have it, the art of perimetry, so much more so than the X-Ray, demands an efficient and exacting perimetrist, who working with the utmost care and scientific thoroughness brings to light with his wands various general as well as ocular defects. Just as the dentist turns to the X-Ray to confirm the presence of an alveolar abscess, so does the optometrist or ophthalmologist resort to the perimeter in an effort to ascertain the cause of obscure and troublesome symptoms.

Perimetry in brief is divided into two types—quantitative and qualitative. The

former is concerned with the investigation of field limits when the size of the test object is the variable, whereas the latter is concerned with the field limits when the visual angle is constant, the color being varied. The quantitative method has been useful in detecting slight peripheral brain lesions and in obtaining the dividing line in the hemianopsias. The qualitative method is the most useful and is the general method employed to bring to light the abstruse as well as to confirm the more or less apparent diseases.

Thanks to the labors of Feree and Rand the external factors have been so regulated that the chance for error from these sources is minimized. The lighting, fixation, and contrast have been investigated so that the abnormal findings may have more significance. With the passing of time the perimeter is sure to occupy the place it should deserve in the field of eyework.

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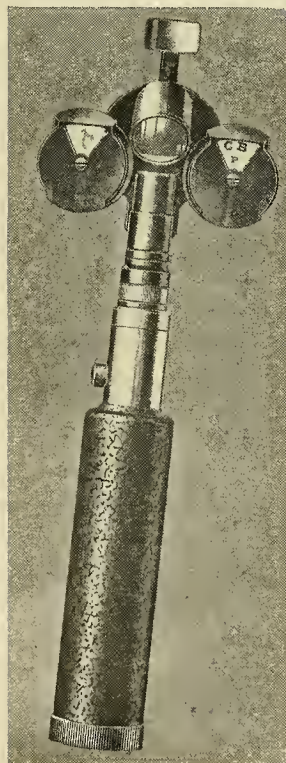
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